



Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

Claims 1-27 (Canceled)

Claim 28 (Previously Presented): A stage unit comprising:

a sample stage that holds a sample;

a stage driving mechanism that drives the sample stage in at least one direction;

a first transmitting member to which at least one part of the stage driving mechanism is connected and a reaction force caused by driving the sample stage is transmitted; and

a first damping member that is arranged on the first transmitting member and damps a vibration of the first transmitting member, the first damping member being arranged at a position where a maximum strain of the first transmitting member is caused.

Claim 29 (Previously Presented): A stage unit according to Claim 28, wherein the stage driving mechanism comprises a stator arranged on the first transmitting member and a mover that is driven together with the sample stage by an electro-magnetic interaction between the stator and the mover.

Claim 30 (Cancelled)

Claim 31 (Previously Presented): A stage unit according to Claim 28, wherein the first damping member is a piezo-electric element having electrodes at both ends and each of the electrodes is grounded via a resistor.

Claim 32 (Previously Presented): A stage unit according to Claim 28, wherein the first damping member is an electro-mechanical transducer that generates a mechanical strain by applying an electric energy, and the stage unit further comprises a controller that controls the electro-mechanical transducer in accordance with a reaction force caused by driving the sample stage.

Claim 33 (Previously Presented): A stage unit according to Claim 32, wherein the controller controls the electro-mechanical transducer based on an instructing value of a drive force of the sample stage.

Claim 34 (Previously Presented): A stage unit according to Claim 33, wherein the controller feed-forward controls a voltage applied to the electro-mechanical transducer so that the electro-mechanical transducer generates a deflection deformation to cancel a deformation, which is caused in the first transmitting member by the reaction force, in the first transmitting member.

Claim 35 (Previously Presented): A stage unit according to Claim 28, further comprising:

a stage base that movably supports the sample stage and is supported independently of the first transmitting member.

Claim 36 (Previously Presented): A stage unit according to Claim 28, wherein the sample stage comprises:

a coarse stage that moves in the one direction; and

a fine stage that holds the sample and is movable relative to the coarse stage.

Claim 37 (Previously Presented): A stage unit according to Claim 36, further

comprising:

a second transmitting member in which a reaction force caused by driving the fine stage is transmitted via the coarse stage;

a linear actuator that drives the second transmitting member in the one direction;

a second damping member that is arranged on the second transmitting member and damps a vibration of the second transmitting member due to the reaction force caused by driving the fine stage; and

a first controller that controls the stage driving mechanism and the linear actuator so that the coarse stage and the second transmitting member integrally move in the one direction.

Claim 38 (Previously Presented): A stage unit according to Claim 37, wherein the second damping member is arranged to a position where a maximum strain of the second transmitting member is caused.

Claim 39 (Previously Presented): A stage unit according to Claim 37, wherein the second damping member is an electro-mechanical transducer that generates a mechanical strain by applying an electric energy, and

the stage unit further comprises a second controller that controls the electro-mechanical transducer in accordance with the reaction force caused by driving the fine stage.

Claim 40 (Previously Presented): A stage unit according to Claim 39, wherein the second controller controls the electro-mechanical transducer based on an instructing value of a drive force of the fine stage.

Claim 41 (Previously Presented): A stage unit according to Claim 40, wherein

the second controller feed-forward controls a voltage applied to the electro-mechanical transducer so that the electro-mechanical transducer generates a deflection deformation to cancel a deformation, which is caused in the second transmitting member by the reaction force, in the second transmitting member.

Claim 42 (Previously Presented): An exposure apparatus comprising a mask stage unit including a mask stage that moves and holds a mask, as a sample, having a pattern, and a substrate stage unit including a substrate stage that moves and holds a substrate, as a sample, onto which the pattern is transferred, wherein

the stage unit according to Claim 28 is used for at least one of the mask stage unit and the substrate stage.

Claim 43 (Previously Presented): An exposure apparatus according to Claim 42, further comprising

a projection optical system that is arranged between the mask and the substrate and projects the pattern onto the substrate.

Claim 44 (Previously Presented): An exposure apparatus according to Claim 43, further comprising

a holder that is independent of the first transmitting member with respect to a vibration and holds the projection optical system.

Claim 45 (Previously Presented): An exposure apparatus according to Claim 42, further comprising

a controller that synchronously moves the mask and the substrate, when the pattern is transferred onto the substrate.

Claim 46 (Currently Amended): An exposure apparatus that forms a pattern on a substrate while a stage moves, comprising:

a driver having a first member coupled to the stage and having a second member configured to drive the stage;

a stage base that movably supports the stage;

a counter stage that moves in a direction opposite to the stage in accordance with movement of the stage, the counter stage being coupled to the second member;

a first supporting frame that is arranged independently of the stage base and movably supports the counter stage; and

a damping member that is arranged on the first supporting frame and damps a vibration of the first supporting frame.

Claim 47 (Previously Presented): An exposure apparatus according to Claim 46, wherein

the stage is a substrate stage that holds the substrate and moves.

Claim 48 (Previously Presented): An exposure apparatus according to Claim 46, wherein

the stage is a mask stage that holds a mask on which the pattern is formed and moves.

49-50 (Cancelled)

Claim 51 (Previously Presented): An exposure apparatus according to Claim 46, further comprising

an original-position return mechanism that returns a position of the counter stage to an origin.

Claim 52 (Previously Presented): An exposure apparatus according to Claim 46, further comprising:

a projection optical system that projects the pattern onto the substrate; and
a second supporting frame that is arranged independently of the first supporting frame with respect to a vibration and supports the projection optical system.

Claim 53 (Previously Presented): A device manufacturing method including a lithography process, wherein

exposure is performed in the lithography process by using the exposure apparatus according to Claim 43.

Claim 54 (Previously Presented): A device manufactured by the device manufacturing method according to Claim 53.

Claim 55 (Currently Amended): An exposure apparatus according to Claim 46, wherein

the damping member comprises a piezo-electric ~~element~~ element.

Claim 56 (Previously Presented): An exposure apparatus according to Claim 46, wherein

the damping member comprises an electro-mechanism transducer that generates a mechanical strain.

Claim 57 (Previously Presented): An exposure apparatus according to Claim 46, wherein

the damping member is arranged at a position where a maximum strain of the first supporting frame is caused.

Claim 58 (Currently Amended): A stage apparatus having a movable stage, comprising:

a driver having a first member coupled to the movable stage and having a second member configured to drive the movable stage;

a counter stage that moves in a direction opposite to the movable stage in accordance with a movement of the movable stage, the counter stage being coupled to the second member;

a first supporting frame that movably supports the counter stage; and

a damping member that is arranged on the first supporting frame and damps a vibration of the first supporting frame.

Claim 59 (Previously Presented): A stage apparatus according to Claim 58, further comprising:

a base that is different from the first supporting frame to movably support the movable stage.

Claim 60 (Previously Presented): An exposure apparatus according to Claim 58, wherein

the damping member is arranged at a position where a maximum strain of the first supporting frame is caused.

Claim 61 (New): An exposure apparatus according to Claim 46, wherein the driver comprises a linear motor.

Claim 62 (New): A stage apparatus according to Claim 58, wherein the driver comprises a linear motor.

Appln No. 09/830,684

Reply to Office Action of April 24, 2003

Claim 63 (New): A stage apparatus according to Claim 58, further comprising:

an adjuster that adjusts a position of the counter stage.